How does the understanding of ancient and planetary climates help us prepare for our own environmental crossroads?

In 1928, MIT became the first institution in the nation to establish a meteorology curriculum, and has been a leader in climate science ever since. Continuing to advance our understanding of climate systems is one of the great intellectual challenges—and responsibilities—of our time. With cyclones growing in frequency and ferocity, communities increasingly being threatened by landslides and extreme flood events, and melting permafrost endangering habitats and belching large amounts of trapped carbon dioxide and methane into the atmosphere, the need for fundamental research is becoming more and more critical. Collaborating with researchers across multiple disciplines, we are determined to understand how climate works and how our scientific knowledge can guide us toward long-term sustainability.

To help plan for the future, we seek to answer profound questions. What caused Earth's past climate shifts, and what is our climate's natural variability? How do climates evolve on other planets? What role do the oceans play in regulating Earth's temperature? What about their role in the carbon cycle? Can microbes influence the atmosphere? How does ocean acidification affect the biosphere? Does airborne particulate matter affect cloud formation? What are the links between anthropogenic activities, air and ocean pollution, and climate change? Does rapid climate change contribute to mass extinctions?

CAMPAIGN FOR A BETTER WORLD

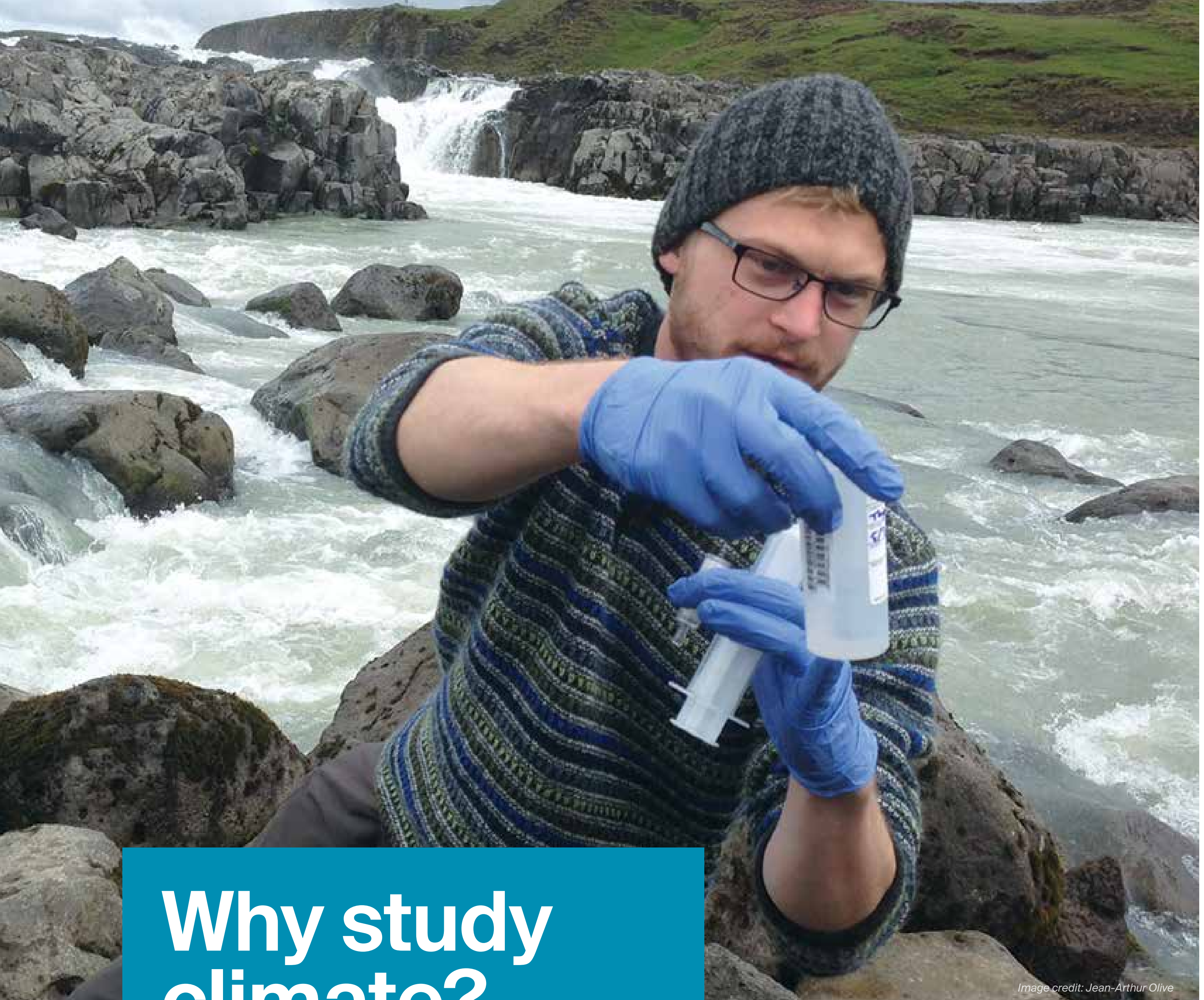


Image credit: Jean-Arthur Olive

Why study climate?

Climate change is one of the most pressing issues facing the world today. Warming oceans, melting ice caps, and rising sea levels indicate Earth could be approaching a tipping point, with vast potential economic and humanitarian implications—including destruction of property and infrastructure, disruptions in trade, relocation of communities, pressures on food production, and threats to human health. Fundamental climate research provides the quantitative evidence needed to accelerate the development of practical solutions, new technologies, and policy initiatives to mitigate the impacts of climate change.

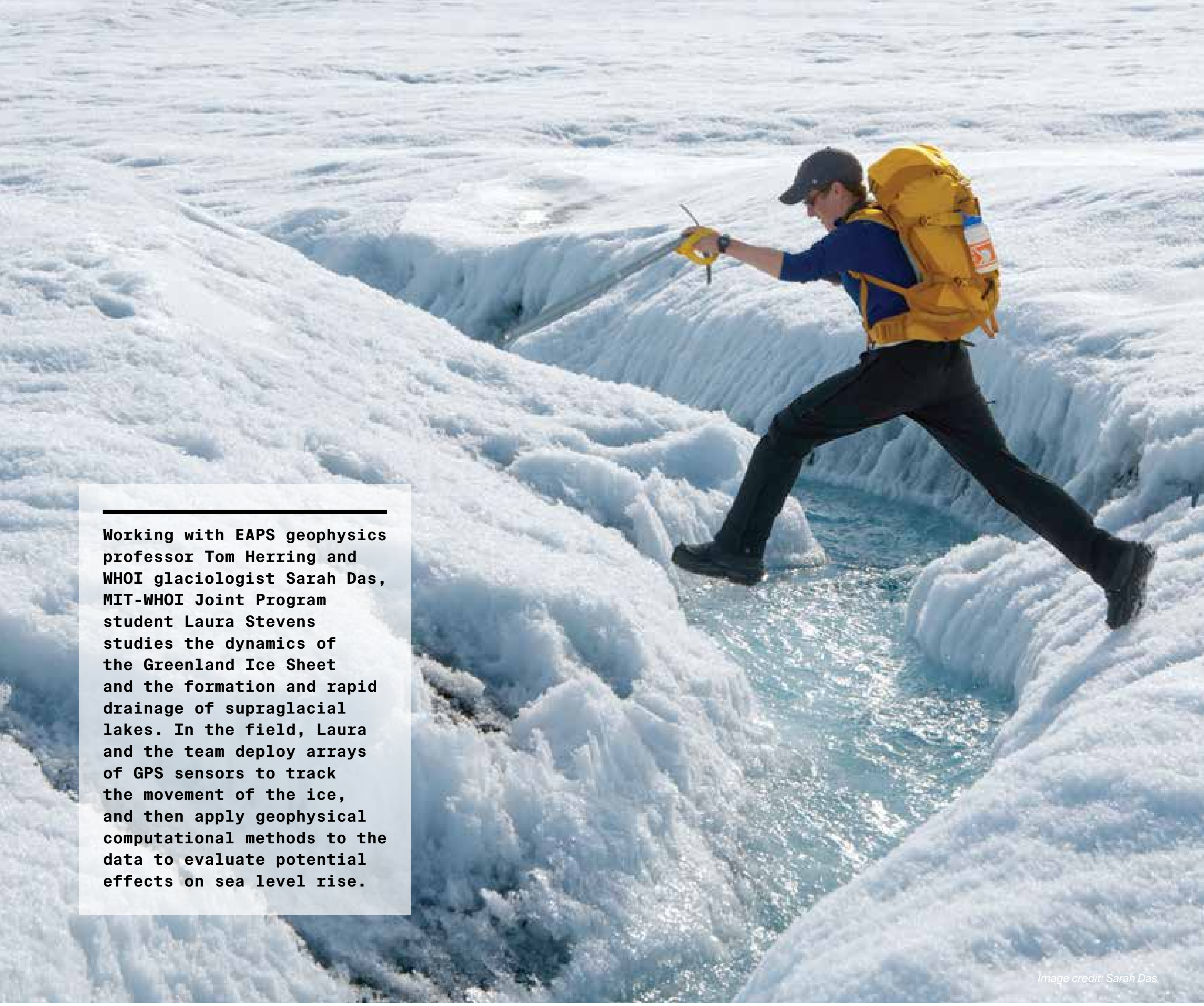
Collecting water samples from the Thjorsá River in Iceland, MIT-WHOI Joint Program student Jordon Hemingway studies the role rivers play in regulating climate by transporting carbon-containing sediments to the sea.

Image credit: Kent Dayton

How do EAPS scientists conduct their research?

In EAPS, atmospheric scientists, oceanographers, geologists, and planetary scientists work together to understand the elaborate, interconnected natural systems which combine to produce and influence our climate. Precise uranium dating of stalagmites found in a Nevada desert cave provides a timeline for a once much wetter American West. In the mountains of Rwanda, the first long-term atmospheric observing station on the African continent will fill in vital missing data about global greenhouse gas emissions. The MIT Global Circulation Model—a sophisticated virtual tool now used by hundreds of researchers around the world—simulates the interplay between the oceans, atmosphere, and climate in 3-D, with the capacity to examine ocean dynamics at the planetary scale, all the way down to fine resolutions of just one square kilometer. Seismic sensor networks allow us to continuously monitor seasonal fluctuations in the Greenland ice sheet. And by making a few adjustments to a cloud chamber designed to study atmospheric conditions on Earth, we are able to create a Martian analog which allows us to study how clouds may form on the red planet, giving us insight into the mechanics of our own climate.

Cziczo Lab Postdoctoral Fellow Alexandria Johnson uses the tools of terrestrial cloud research to investigate how exoplanet cloud particles scatter and modify light from their host stars, and how this might affect the detection of biosignatures through the cloud layers of other planets.



Working with EAPS geophysics professor Tom Herring and WHOI glaciologist Sarah Das, MIT-WHOI Joint Program student Laura Stevens studies the dynamics of the Greenland Ice Sheet and the formation and rapid drainage of supraglacial lakes. In the field, Laura and the team deploy arrays of GPS sensors to track the movement of the ice, and then apply geophysical computational methods to the data to evaluate potential effects on sea level rise.

Image credit: Sarah Das

EAPS

http://eapsweb.mit.edu

Join Us

For our work to continue, we need you. EAPS relies on generous gifts from our alumni and friends to ensure we continue to attract the most outstanding students and scientists in the field. There are a number of ways you can participate, such as supporting a graduate student or donating to our Discretionary Fund. Or, better yet, establish your own fellowship and create a lasting legacy at MIT.

For more information about EAPS and how to support our research and our graduate students, please contact Angela Ellis, Senior Development Officer, at 617-253-5796 or aellis@mit.edu.

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